Editorial

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Sustainability has dominated construction materials research in recent years and is likely to do so for some considerable time to come. In particular, papers in *Construction Materials* have highlighted the need to deliver low-carbon solutions in order to limit the effect of the built environment on climate change. While there is some way to go, sustainability has become an integral part of construction practice.

Nonetheless, in addition to investigating the effect of construction on climate change, it is necessary to consider the effect of climate change on our infrastructure and buildings. Of particular concern are events arising from extreme weather and the increased likelihood of flooding, periods of droughts, and hotter and colder temperatures. Addressing how we create buildings that are resistant to such changes provides numerous research challenges. Furthermore, design to mitigate the effects of climate change may be considered part of a much larger requirement to create a built environment that is resilient to extreme events; including terrorism, earthquakes and other disasters. It is my opinion that the development of new and improved construction materials will play a key role in creating a built environment that is able to adapt and recover from these extreme events.

This issue of *Construction Materials* contains four papers that partly reflect on the need for materials that are resilient to future environmental changes. The first paper (Gupta *et al.*, 2015) considers a construction material, wood, that has been used since ancient times, but which may be susceptible to future fluctuations in solar radiation, water and moisture conditions, and insect and fungal activity. Generally, wood is protected from degradation by use of coatings but the level of protection afforded varies with exposure and wood growth conditions. In addition to their other stated aims, the work reported by Gupta *et al.* (2015) has demonstrated that increased humidity and temperature in combination will accelerate the degradation of wood and coatings. This has consequences for the choice and development of wood coatings to deliver future resilience.

Likewise concrete also requires protection from environmental deterioration and for this reason surface applied pore lining water repellents or hydrophobic agents are commonly impregnated into concrete. However, one of the problems with this solution is that impregnation should optimally take place on a

dry surface. The paper by Rahman *et al.* (2015) investigates the consequences of applying protection after a prolonged period of wet weather and they report that the required level of protection may not be obtained in such conditions. This has consequences for how we protect concrete structures in the future.

These first two papers describe research to investigate the suitability of external protection to construction materials for improved resistance to aggressive weather and other agents. However, it has been suggested that use of geopolymers rather than cement may inherently lead to concrete with reduced water permeation and improved long-term durability properties. Unfortunately, one of the issues with geopolymer concrete is that the curing requires special attention. The paper by Srinivasan and Sivakumar (2015) considers the effect of accelerating agents on the geopolymerisation process. Their work demonstrates that these agents lead to geopolymer mixtures with improved properties at early ages. This work will support efforts to develop geopolymer as a mainstream construction material.

In the final paper of this issue, Hossain (2015) presents research to determine the properties of lightweight self-consolidating (or self-compacting) concrete using volcanic and other natural materials. Again a key aspect of the work relates to durability. It is shown that there are positive influences of these natural lightweight materials in satisfactory durability performance, partly due to refinement of pore structure and the creation of a balanced air void system.

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